WHAT IS CLAIMED IS:

1. A method for treating a patient having a condition mediated by neurotoxicity, neurodegeneration or neurological damage, comprising administering to said patient a therapeutically effective amount of a peptide comprising one or more monomeric peptides of 8 to about 40 amino acids in length that bind to EPO receptor, each monomeric peptide comprising a sequence of amino acids $X_4X_5X_aX_bX_6X_cX_dX_7$ (SEQ ID NO: 47), wherein

X_a is G or A;

X_b is P or A;

X_c is T or A;

X_d is selected from W, A, and F;

X_4 is selected from R, H, Y, L, and W, or X_4 is nonexistent;

X_5 is selected from F, M, and I;

X_6 is independently selected from the 20 genetically coded L-amino acids or the stereoisomeric D-amino acids; and

X_7 is selected from D, V, E, I, and L.

2. The method of claim 1, wherein said sequence is $X_4X_5GPX_6TWX_7$ (SEQ ID NO: 48.

3. The method of claim 2, wherein said sequence is $X_3X_4X_5GPX_6TWX_7X_8$ (SEQ ID NO: 1), wherein

X_3 is selected from C, E, A, α-amino-γ-bromobutyric acid, and homocysteine (Hoc); and,

X_8 is selected from C, K, A, α-amino-γ-bromobutyric acid, and homocysteine (Hoc).

4. The method of claim 3 with the proviso that either X_3 or X_8 is C or homocysteine (Hoc).

5. The method of claim 4 wherein X_3 or X_8 is C.

6. The method of claim 3 wherein

X_3 is selected from C, E, and A;

X_4 is selected from R, H, and Y, or X_4 is nonexistent;

X_6 is selected from V, L, I, M, E, and A; and

X_7 is D or V; and

X_8 is selected from C, K and A.

7. The method of claim 3 wherein said peptide is a dimer of each of said monomeric peptides comprising a sequence of amino acids $YX_2X_3X_4X_5GPX_6TWX_7X_8$ (SEQ ID NO: 2), wherein

X_2 and X_6 are each independently selected from the 20 genetically coded L-amino acids;

X_3 is C; and

X_8 is C.

8. The method of claim 7 wherein

X_2 is selected from L S H M A and I, or X_2 is nonexistent; and

X_6 is selected from V, L, I, M, E, and A.

9. The method of claim 7 wherein each of said monomeric peptides comprises a sequence of amino acids $X_1YX_2X_3X_4X_5GPX_6TWX_7X_8X_9X_{10}X_{11}$ (SEQ ID NO: 3), wherein each of X_1, X_2, X_6, X_9, X_{10}, and X_{11} is independently selected from the 20 genetically coded L-amino acids.

10. The peptide dimer of claim 9 wherein

X_3 is selected from C, E, and A;

X_4 is selected from R, H, and Y, or X_4 is nonexistent;

X_7 is D or V;

X_8 is C or K.

X_9 is K, G, L, Q, R, S, or T; and

X_{10} is A, G, P, R, or Y.

11. The method of Claim 10 wherein

X_1 is D, E, L, N, S, T or V;

X_2 is selected from L, S, H, M, A, and I, or X_2 is nonexistent;

X_9 is selected from K, Q, R, S, and G; and

X_{10} is selected from P, Y, and A.

12. The method of claim 3 wherein said peptide is a dimer of each of said monomeric peptides comprising a sequence of amino acids $X'X_2X_3X_4X_5GPX_6TWX_7X_8$ (SEQ ID NO: 49), wherein X' is selected from D-Tyr, *p*-NO_2-Phe, *p*-NH_2-Phe, *p*-F-Phe, *p*-I-Phe, and 3,5-dibromo-Tyr.

13. The method of claim 12 wherein said sequence is X'CHFGPLTWVC.

14. The method of claim 1 wherein each of said monomeric peptides comprise a sequence independently selected from

GGLYLCRFGPVTWDCGYKGG		(SEQ ID NO:7);
GGTYSCHFGPLTWVCKPQGG	(aka EMP-1)	(SEQ ID NO:8);
GGDYHCRMGPLTWVCKPLGG		(SEQ ID NO:9);
VGNYMCHFGPITWVCRPGGG		(SEQ ID NO:10);
GGVYACRMGPITWVCSPLGG		(SEQ ID NO:11);
VGNYMAHMGPITWVCRPGG		(SEQ ID NO:12);
GGTYSCHFGPLTWVCKPQ	(aka EMP-16)	(SEQ ID NO:13);
GGLYACHMGPMTWVCQPLRG	(aka EMP-36)	(SEQ ID NO:14);
TIAQYICYMGPETWECRPSPKA	(aka EMP-38)	(SEQ ID NO:15);
YSCHFGPLTWVCK	(aka EMP-20	(SEQ ID NO:16);
YCHFGPLTWVC	(aka EMP-23)	(SEQ ID NO:17);
SCHFGPLTWVCK	(aka EMP-24)	(SEQ ID NO:18);
GGTASCHFGPLTWVCKPQGG	(aka EMP-6)	(SEQ ID NO:19);
GGTYSCHFAPLTWVCKPQGG	(aka EMP-9)	(SEQ ID NO:20);
GGTYSCFGPLTWVCKPQGG	(aka EMP-27)	(SEQ ID NO:21);
TYSCHFGPLTWVCKPQGG	(aka EMP-17)	(SEQ ID NO:22);
TYSCHFGPLTWVCKPQ	(aka EMP-18)	(SEQ ID NO:23);
YSCHFGPLTWVCKP	(aka EMP-19)	(SEQ ID NO:24);
YSCHFGPLTWVC	(aka EMP-21)	(SEQ ID NO:25);
YSCHFGALTWVCK	(aka EMP-22)	(SEQ ID NO:26);

GGCRIGPITWVCGG (aka EMP-25) (SEQ ID NO:27);
HFGPLTWV (aka EMP-26) (SEQ ID NO:28);
GGTTSCHFGPLTWVCKPQGG (aka EMP-7) (SEQ ID NO:29);
GGTFSCHFGPLTWVCKPQGG (aka EMP-8) (SEQ ID NO:30);
GGTYSCHFGALTWVCKPQGG (aka EMP-10) (SEQ ID NO:31);
GGTYSCHFGPATWVCKPQGG (aka EMP-11) (SEQ ID NO:32);
GGTYSCHFGPLAWVCKPQGG (aka EMP-12) (SEQ ID NO:33);
GGTYSCHFGPLTAVCKPQGG (aka EMP-13) (SEQ ID NO:34);
GGTYSCHFGPLTFVCKPQGG (aka EMP-14) (SEQ ID NO:35);
GGTYSCHFGPLTWVCKAQGG (aka EMP-15) (SEQ ID NO:36);
GGTXSCHFGPLTWVCKPQGG (aka EMP-28, X = D-Tyr) (SEQ ID NO:37);
GGTXSCHFGPLTWVCKPQGG (aka EMP-29, X = *p*-NO_2-Phe) (SEQ ID NO:38);
GGTXSCHFGPLTWVCKPQGG (aka EMP-30, X = *p*-NH_2-Phe) (SEQ ID NO:39);
GGTXSCHFGPLTWVCKPQGG (aka EMP-31, X = *p*-F-Phe) (SEQ ID NO:40);
GGTXSCHFGPLTWVCKPQGG (aka EMP-32, X = *p*-I-Phe) (SEQ ID NO:41);
GGTXSCHFGPLTWVCKPQGG (aka EMP-33, X = 3,5-dibromo-Tyr) (SEQ ID NO:42);
Ac-GGTYSCHFGPLTWVCKPQGG (aka EMP-34) (SEQ ID NO:43);
GGLYACHMGPMTWVCQPLGG (aka EMP-35) (SEQ ID NO:44);
LGRKYSCHFGPLTWVCQPAKKD (aka EMP-37) (SEQ ID NO:45); and
GGTYSEHFGPLTWVKKPQGG (aka EMP-39) (SEQ ID NO:46).

15. The method of claim 14 wherein each of said monomeric peptides is independently selected from:

GGTYSCHFGPLTWVCKPQGG (aka EMP-1) (SEQ ID NO:8);
GGTASCHFGPLTWVCKPQGG (aka EMP-6) (SEQ ID NO:19);
GGTYSCHFAPLTWVCKPQGG (aka EMP-9) (SEQ ID NO:20); and
YCHFGPLTWVC (aka EMP-23) (SEQ ID NO:17).

16. The method of claim 1 wherein said peptide is a dimer formed by a polyethylene glycol linker through a covalent bond.

17. The method of claim 16 wherein each monomeric peptides of said dimer are covalently bound N-terminus to N-terminus.

18. The method of claim 16 wherein each monomeric peptides of said dimer are covalently bound N-terminus to C-terminus.

19. The method of claim 1 wherein said monomeric peptides are dimerized on activated benodiazepins, oxazalones, azalactones, aminimides or diketopiperazine.

20. The method of claim 19 wherein said monomeric peptides are covalently bound N-terminus to N-terminus.

21. The method of claim 19 wherein said monomeric peptides are covalently bound N-terminus to C-terminus.

22. The peptide of claim 2, which comprises least one peptide dimer.

23. A method of activating a cell surface receptor to induce neuroprotective biological activity comprising contacting a dimer of peptides of claim 2 with said receptor thereby inducing said neuroprotective biological activity.

24. The method of claim 23 wherein said cell surface receptor is contacted with said dimer <u>in vitro</u> or <u>in vivo</u>.

25. The method of claim 23 wherein said cell surface receptor is EPO receptor.

26. The method of claim 23 wherein said peptide dimer is a cell surface receptor agonist selected form a group consisting of a GH agonist, PDGF agonist, EGF agonist, G-CSF agonist, TPO (thrombopoietin) agonist, VEGF agonist, FGF agonist, insulin agonist, IL-3 agonist, IL-5 agonist, IL-6 agonist and IL-2 agonist.

27. The method of claim 23 wherein said agonist comprises a sequence of amino acids $YX_2X_3X_4X_5GPX_6TWX_7X_8$ (SEQ ID NO: 2) wherein each of X_2 and X_6 is independently selected from the 20 genetically coded L-amino acids; X_3 is C; X_4 is R, H, L or W; X_5 is M, F or I; X_7 is D, E, I, L or V; and X_8 is C.

28. The method of claim 23 wherein said agonist comprises a sequence of amino acids $X_1YX_2X_3X_4X_5GPX_6TWX_7X_8X_9X_{10}X_{11}$ (SEQ ID NO: 3) wherein each of X_1, X_2, X_6, X_9, X_{10}, and X_{11} is independently selected from any one of the 20 genetically coded Lamino acids; X_3 is C; X_4 is R, H, L or W; X_5 is M, F or I; X_7 is D, E, I, L or V; and X_8 is C.

29. The method of claim 23 wherein said agonist comprises a sequence of amino acids $X_1YX_2X_3X_4X_5GPX_6TWX_7X_8X_9X_{10}X_{11}$ (SEQ ID NO: 3) wherein each of X_1, X_2, and X_{11}, is independently selected from any one of the 20 genetically coded L-amino acids; X_3 is C; X_4 is R or H; X_5 is F or M; X_6 is I, L, T, M or V; X_7 is D or V; X_9 is G, K, L, Q, R, S, or T; and X_{10} is A, G, P, R, or Y.

30. The method of claim 23 wherein said agonist comprises a sequence of amino acids $X_1YX_2X_3X_4X_5GPX_6TWX_7X_8X_9X_{10}X_{11}$ (SEQ ID NO: 3) wherein X_1 is D, E, L, N, S, T or V; X_2 is A, H, K, L, M, S, or T; X_3 is C; X_4 is R or H; X_5 is M, F or I; X_6 and X_{11} are independently any one of the 20 genetically coded L- amino acids; X_7 is D, E, I, L or V; X_8 is C; X_9 is K, R, S, or T; and X_{10} is P.

31. The method of claim 23 wherein said agonist is selected from a group consisting of:

GGLYLCRFGPVTWDCGYKGG (SEQ ID NO:7);
GGTYSCHFGPLTWVCKPQGG (aka EMP-1) (SEQ ID NO:8);
GGDYHCRMGPLTWVCKPLGG (SEQ ID NO:9);
VGNYMCHFGPITWVCRPGGG (SEQ ID NO:10);
GGVYACRMGPITWVCSPLGG (SEQ ID NO:11);
VGNYMAHMGPITWVCRPGG (SEQ ID NO:12);
GGTYSCHFGPLTWVCKPQ (aka EMP-16) (SEQ ID NO:13);
GGLYACHMGPMTWVCQPLRG (aka EMP-36) (SEQ ID NO:14);
TIAQYICYMGPETWECRPSPKA (aka EMP-38) (SEQ ID NO:15);
YSCHFGPLTWVCK (aka EMP-20 (SEQ ID NO:16);
YCHFGPLTWVC (aka EMP-23) (SEQ ID NO:17);
SCHFGPLTWVCK (aka EMP-24) (SEQ ID NO:18);
GGTASCHFGPLTWVCKPQGG (aka EMP-6) (SEQ ID NO:19);
GGTYSCHFAPLTWVCKPQGG (aka EMP-9) (SEQ ID NO:20);
GGTYSCFGPLTWVCKPQGG (aka EMP-27) (SEQ ID NO:21);
TYSCHFGPLTWVCKPQGG (aka EMP-17) (SEQ ID NO:22);
TYSCHFGPLTWVCKPQ (aka EMP-18) (SEQ ID NO:23);
YSCHFGPLTWVCKP (aka EMP-19) (SEQ ID NO:24);
YSCHFGPLTWVC (aka EMP-21) (SEQ ID NO:25);
YSCHFGALTWVCK (aka EMP-22) (SEQ ID NO:26);
GGCRIGPITWVCGG (aka EMP-25) (SEQ ID NO:27);
HFGPLTWV (aka EMP-26) (SEQ ID NO:28);
GGTTSCHFGPLTWVCKPQGG (aka EMP-7) (SEQ ID NO:29);
GGTFSCHFGPLTWVCKPQGG (aka EMP-8) (SEQ ID NO:30);
GGTYSCHFGALTWVCKPQGG (aka EMP-10) (SEQ ID NO:31);
GGTYSCHFGPATWVCKPQGG (aka EMP-11) (SEQ ID NO:32);
GGTYSCHFGPLAWVCKPQGG (aka EMP-12) (SEQ ID NO:33);
GGTYSCHFGPLTAVCKPQGG (aka EMP-13) (SEQ ID NO:34);
GGTYSCHFGPLTFVCKPQGG (aka EMP-14) (SEQ ID NO:35);
GGTYSCHFGPLTWVCKAQGG (aka EMP-15) (SEQ ID NO:36);

GGTXSCHFGPLTWVCKPQGG (aka EMP-28, X = D-Tyr) (SEQ ID NO:37);
GGTXSCHFGPLTWVCKPQGG (aka EMP-29, X = *p*-NO_2-Phe) (SEQ ID NO:38);
GGTXSCHFGPLTWVCKPQGG (aka EMP-30, X = *p*-NH_2-Phe) (SEQ ID NO:39);
GGTXSCHFGPLTWVCKPQGG (aka EMP-31, X = *p*-F-Phe) (SEQ ID NO:40);
GGTXSCHFGPLTWVCKPQGG (aka EMP-32, X = *p*-I-Phe) (SEQ ID NO:41);
GGTXSCHFGPLTWVCKPQGG (aka EMP-33, X = 3,5-dibromo-Tyr) (SEQ ID NO:42);
Ac-GGTYSCHFGPLTWVCKPQGG (aka EMP-34) (SEQ ID NO:43);
GGLYACHMGPMTWVCQPLGG (aka EMP-35) (SEQ ID NO:44);
LGRKYSCHFGPLTWVCQPAKKD (aka EMP-37) (SEQ ID NO:45); and
GGTYSEHFGPLTWVKKPQGG (aka EMP-39) (SEQ ID NO:46).

32. The method of claim 23 wherein said peptide dimers are formed with a polyethylene glycol linker through a covalent bond.

33. A method of preparing a cell surface receptor agonist comprising dimerizing a cell surface antagonist.

34. The method of claim 33 wherein said cell surface antagonist receptor is a GH antagonist, PDGF antagonist, EGF antagonist, G-CSF antagonist, EGF antagonist, GM-CSF antagonist, TPO antagonist, VEGF antagonist, FGF antagonist, insulin antagonist, IL-3 antagonist, IL-5 antagonist, IL-6 antagonist, or an IL-2 antagonist.

35. The method of claim 33 wherein said cell surface receptor antagonist is an EPO-R antagonist.

36. The method of claim 35 wherein said antagonist comprises a sequence of amino acids $(X?X_2)_nX_3X_4X_5GPX_6TWX_7X_8$ (SEQ ID NO: 19) wherein X_6 is selected from the 20 genetically coded L-amino acids; X_3 is C; X_4 is R, H, L or W; X_5, is M, F or I; X_7, is D, E, I, L or V; X_8 is C; X_2 is selected from the 20 genetically coded L-amino acids, n is 0 or 1 and X? is any of the 20 genetically coded L-amino acids except Y (tyrosine).

37. The method of Claim 33 where said antagonist is SCHFGPLTWVCK (SEQ ID NO: 18).